IN THE SPECIFICATION:

Please substitute the following replacement paragraphs as indicated on the following pages.

Page 3, the paragraph beginning at line 30

U.S. Patent No. 5,046,385 to Ivo Cozzini~~, granted September 10, 1991 Class 76/89.2~~; U.S Patent No. 2,461, 690 to K. K. Leong~~, granted Class 51-214~~; U.S. Patent No. 4,799, 335 to Silvio R. Battachi~~, granted June 24, 1989, Class 51/102~~; U.S. Patent No. 4,197,677 to Louis N. Graves~~, granted April 15, 1980, Class 51/214~~; U.S. Patent No. 4,094,106 ~~granted~~ to Thomas D. Harris ~~June 13, 1978, Class 51/214~~; U.S. Patent No. 4090418 to Shigyoshi Ishida ~~granted May 23, 1978, Class 76/84,~~; U.S. Patent No. 5,163,251 to David Lee~~, granted November 17, 1992 Class 51/214~~. For a variety of individualized reasons none of the prior art devices have proven to be a practical means of reproducibly modifying the physical structure along a cutting edge. None of these cited patents include means to orient with sufficient precision or consistency the angle of the edge facet relative to the hardened surface of a steel rod or other material needed to achieve the results reported in this application. Where there is an effort in the prior art to provide a guide for the knife the means used is angularly inconsistent or inaccurate because of variations in blade geometry, blade height, thickness of blade, etc. or because the accuracy of the means is inherently very poor and variable stroke to stroke.

Page 14, the paragraph beginning at line 30 (previously amended)

Figure 10 represents a precision blade sharpening means with sufficient accuracy to sharpen a knife before it is passed through a precise edge conditioning apparatus. It contains two precision angle guide surfaces 8 and 8a set at angle [[A]] C relative to the plane 11 of a sharpening abrasive layer on the face of rotating disks whose surface are shaped, for example as sections of ~~fustrated cones~~ conical frustums. A knife blade 1 positioned with its face 3 resting on guide plane 8 will be sharpened by this means creating a facet 2 whose plane will be created precisely at angle A relative to the face 3 of the blade. The abrasive coated disks 9 and 9a shown here rotate about their mounting shaft 10 driven by a motor, not shown. The disks are free to move slidingly on shaft 10 against spring 14 on shaft 10 when the disks are displaced from their rest position established by stops 12. After a facet is created on the first side of the blade as shown, the blade can be moved to guide plane 8a where the second facet can be created by the second abrasive coated disk 9a at angle A relative to the opposite guided face 3 of the blade. Sharpening devices of this sort are described in greater detail in earlier U.S. patents of these inventors.

Page 16, after line 18 add the following paragraph

As illustrated in various figures, such as Figures 9-11, the angle A is the angle formed between the edge facet 2 and the guide plane. In Figure 10 angle A is the angle between the facet 2 an the plane 11 of the abrasive coated disk 9 because the facet is disposed against the abrasive surface in order for the facet to have a plane at angle A. Angle B is the angle between the edge facet and the hardened surface of the object. In the case of Figure 10 angle B is zero. Angle C is the angle between the guide surface and the hardened surface. In the case of Figure 10 angle C equals angle A. Angle A plus angle B equals angle C for the conditioning step shown in Figures 9 and 11.

Page 16, the paragraph beginning at line 19

The guide surface described here can be extended flat surfaces or a series of two or more rods or rollers arranged to define an extended plane on which the blade can rest as its edge facets are being sharpened or conditioned in contact with a hardened surface. Figure 11A, for example, shows the blade 1 guided by two rods or rollers 7b defining an extended guide plane opposite hardened surface member 13. It is important that the hardened surface have adequate hardness, however the supporting structure under that surface need not necessarily be of the same hardness.

Page 20, the paragraph beginning at the penultimate line

The hardened member 13, Figure 13 can be secured rigidly to the structure 15 or alternatively the hardened member can be mounted on a structural element so that it is slightly displaceable against a restraining force as the knife edge facet is pressed into contact with the member. The restraining force can be supplied by a restraining mechanism, such as a linear or non-linear spring material or similar means. Designs are possible that allow the user to adjust or select manually the amount of restraining force and extent of displacement. Figures 15 and 16 illustrate one of many possible configurations that incorporate a restraining force concept. The hardened members 13 shown in Figures 15 and 16 can for example be cylinders or tubes with hardened surfaces or body hollowed and threaded internally that can be rotated on threaded rods 18 which extend into support member 19 drilled to accept the unthreaded sections of rods 18 which in turn are grooved to accept elastomeric O-rings 20 which support and physically center the rod 18 in the drilled holes in support member 19. If such or similar structures are mounted in the apparatus of Figures 13 and 14, when knife 1 Figures 13 and 14 is inserted along the elongated guide 17, the hardened member 13 will be contacted by the knife edge facet 2 and displaced slightly angularly or laterally by the application of sufficient downward force to blade 1, causing lateral force to be applied to

O-rings 20. The degree of compression of the O-ring and the resulting angular displacement of hardened member 13 can be limited by physical stops or other means in order to maintain the contact angle B, Figure 11, preferably within 1-2 degrees of the optimum value. By allowing the hardened member to displace slightly in this manner with a controlled resistive pressure, it is possible to minimize the opportunity for excessive forces to be applied by the operator who is applying manually the force between the knife and the hardened member. Excessive force can be detrimental to the progressive process of removing the burr and creating the microstructures along the edge in a optimum manner. However, if it becomes desirable to accelerate the rate of development of microteeth, greater pressure can be applied to the knife, the angle B will increase slightly and the microteeth will develop faster. It was discovered that there is an optimum level of resistive pressure and this apparatus provides a means to create and maintain that optimum level. Commonly a resistive force between 1 to 3 pounds is optimum. The threaded connection of the hardened member to the support rod 18 allows the user to rotate and raise or lower the hardened member 13 in order to expose fresh surfaces of the hardened member to the edge facet 2 as the surface of the hardened member becomes distorted, loaded with debris, or worn excessively by repeated contacts with the blade facets. The threaded connection can be sufficiently tight

that the hardened member 13 does not rotate as the knife edge is rubbed against its contact surface. Alternatively the threaded connection may be loose enough to rotate slowly as a result of rubbing and frictional forces as the blade edge is pulled across the surface of hardened member 13. <u>In that sense, the threaded connection may be considered a braking mechanism which prevents rotation of the rotatable cylindrical object unless a torque is applied to the cylindrical object in excess of that applied by such braking mechanism.</u> The hardened surface preferably will impart little to no conventional abrasive action against the edge structure. If there is any abrasive action along the edge it must be sufficiently small that it does not interfere significantly with the slow process of burr removal by non-abrasive means or prematurely remove the fine microstructure being formed along the blade edge. As explained later herein, an advantage has been shown in some situations for a very light abrasive supplementary action along the edge to reduce slightly the width of the microstructure but this action must be extremely mild and applied with great care in order not to remove the microstructure being created by the hardened member.

Page 27, the paragraph beginning at line 8 (previously amended)

As mentioned earlier, the hardened surface should not have an inherent tendency to abrade. The surface should not be coated with conventional aggressive larger abrasive particles of materials such as diamonds, carbides or abrasive oxides. These materials when in sizable particulate form typically have extremely sharp edges that give them aggressively abrasive qualities. However, these same materials are extremely hard and when prepared in large planar form and highly polished are essentially non-abrasive. The edge conditioning process disclosed here relies on precisely applied angular pressure by a hardened surface against the facet at its edge in order to repeatedly create and fracture a microstructure along the edge at the extreme terminus of the facets. The process of repeatedly rubbing the knife facet and edge structure against the harder surface stress ~~hardness~~ hardens the facet adjacent to the edge, fractures the edge below the edge line and deforms the metal immediately adjacent to the edge. The metal along the lower portion of the facet adjacent the edge is deformed, smeared by the localized contact pressure and microsheared as a result of the very small differential angular alignment of the plane of the hardened surface and the plane of the edge facet. Thus the localized contact pressure slowly fractures the microteeth along an edge and slowly and selectively re-angles the lower portion of

the facet to conform closely to the plane of the hardened surface. It is clear that if the differential angular alignment is too great or if there is any true abrasive action at the edge the microstructure that otherwise would be slowly created and recreated will be prematurely abraded away and destroyed. The rate of facet deformation and metal removal adjacent the edge must be minimized in order that the microstructure has time to develop and be protected from direct abrasion. The amount of wear along the lower portion of the facet that can occur from the inherent roughness of the hardened surface in the low micron range appears acceptable. Surface roughness (as contrast to dimensions of small repetitive geometric features) greater than about 10 microns will in some cases depending on pressures and the rate of microtooth development be about the practical limit in order that such roughness does not lead to excessive metal removal while the optimum microstructure is being created. Consequently it is important that the hardened surface not have significant abrasive quality.

Page 28, the paragraph beginning at line 21 (previously amended)

Because it is important to control angle B between the plane of the sharpened facet along the edge and the surface at point of contact with the hardened surface, in the optimal situation it is important as described above to control both angle A of the facet (Figure 10) and angle C in the conditioning operation Figure 11 so that the difference angle B (angle C - angle A) is closely controlled. For this reason it is now clear that there is a major advantage to creating a single apparatus 39 such as shown in ~~shown in~~ Figures 17 and 18 including a sharpening station and an edge conditioning station 26, each with precisely controlled angles A and C respectively. The sharpening stage can be either manual or powered but in this example the sharpening stage is powered, as activated by switch 32. The first (sharpening) stage 25 of this apparatus has elongated guide planes 23 each set at angle A relative to the blade face and the abrasive surfaces. The guide planes 24 in the second (edge conditioning) stage 26 each are set at angle C relative to the contact surface of hardened member 13. The first stage Figure 17 is shown with U-shaped guide spring 22 designed to hold the knife securely against elongated guide plane 23 as the knife is pulled along said elongated guide plane and brought into contact with sharpening disks 9 and 9a (Figures 10 and 18).